Realistic Visualizations Using 3ds Max and Unity

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About the speaker

Rajarshi Ray

Rajarshi Ray is a Designated Support Specialist within the Autodesk Global Product Support. Having an engineering background with vast experience in the field of VFX industry & Architectural Visualization. Ray’s role is to support Autodesk Premium Customers using M&E & AEC products, he is based in Barcelona.

Summary

Taking architectural models into 3D Rendering/Game Engine is becoming a hot topic in the industry as companies are giving every effort to create realistic design visualization, AR & VR. Talking to architects & engineers, everyone wants to create visualization in **quick & easy** way, without much spending time in 3ds Max & Unity. This class will be focused more on creating realistic visualization in **quick(1,2,3)** process. Tips & tricks covering main points on bringing architectural model from Autodesk Revit to 3DS Max for optimization, rendering with Arnold renderer and then take it to Unity game engine. The class can be taken as guideline to be ready with model for visualization in real quick.

Learning objectives

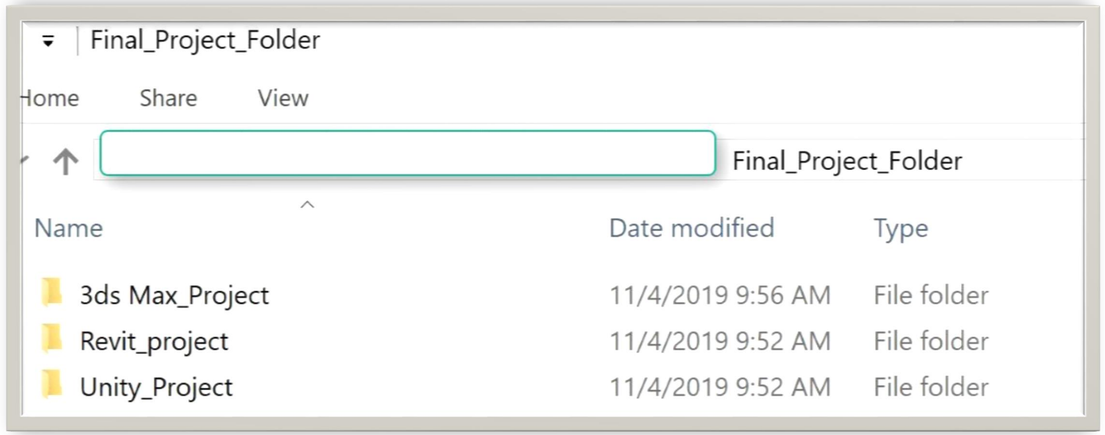
- Quick & effective setup Revit file before taking to 3ds Max & Unity
- Efficient model optimization in 3ds Max
- Quick render using Arnold in 3ds Max
- Tips & tricks taking model be ready for Game engine/Unity

Basic House Keeping

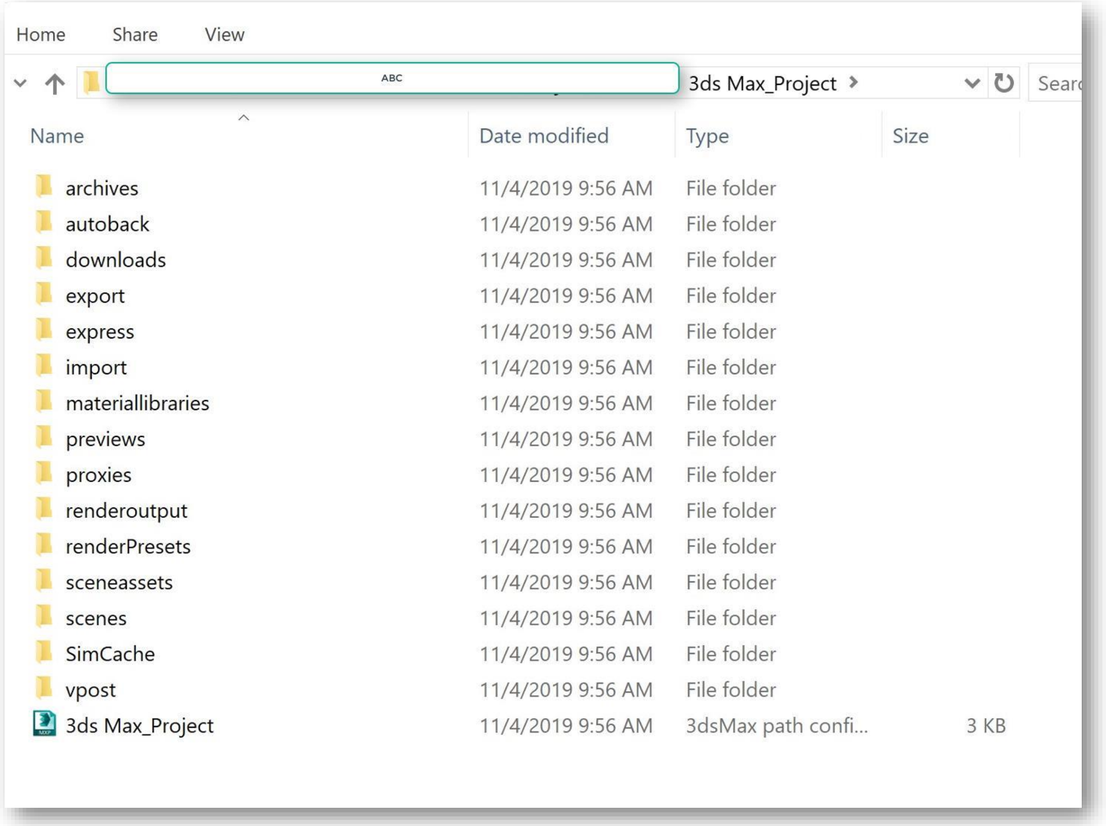
Folder Structure

Basic House Keeping- Folder Structure

Project Folder

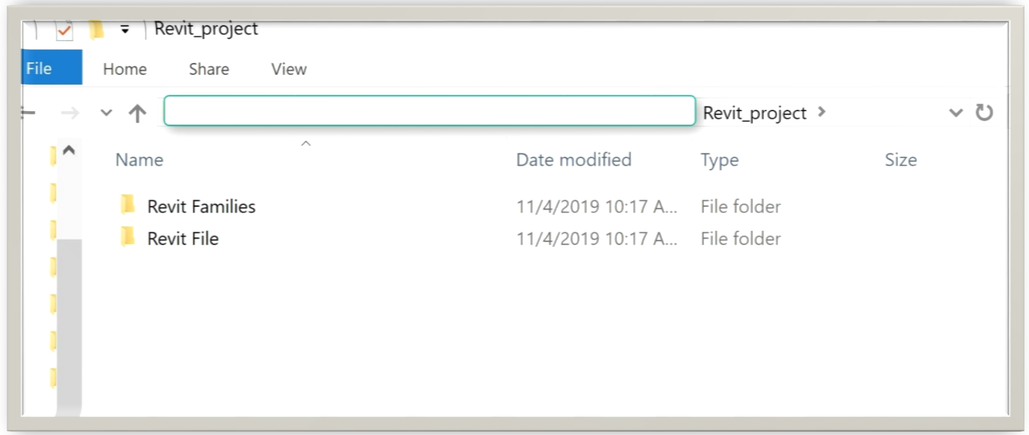


3ds Max Folder

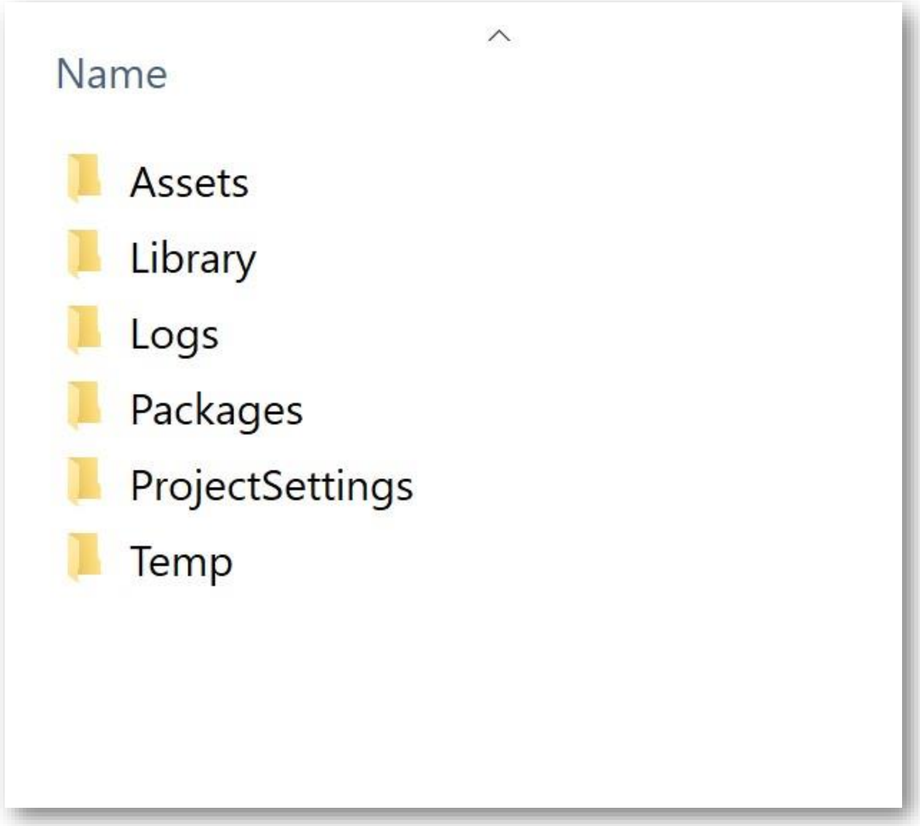


Basic House Keeping- Folder Structure

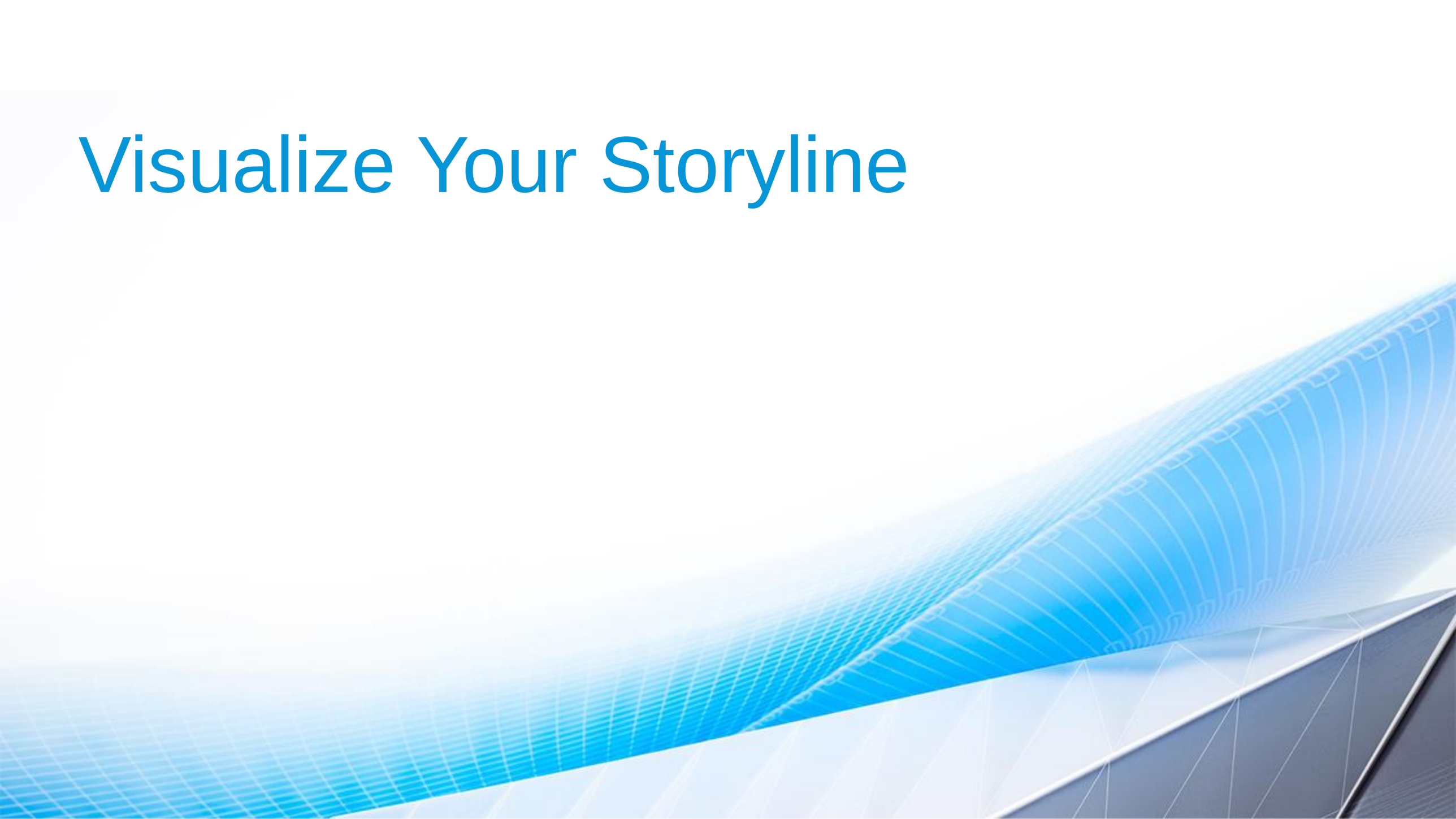
Revit Folder



Unity



Visualize Your Storyline



Visualize Your Story

- **Final Story line / Final output**
  - Preparing a list elements/object what will be shown
  - Camera movement / camera position

Revit Architecture – File Setup

Autodesk Revit 2020 - rac_advanced_sample_project - 3D View: From Parking Area

rajarshi.ray

File | Architecture | Structure | Steel | Systems | Insert | Annotate | Analyze | Massing & Site | Collaborate | View | Manage | Add-Ins | Modify

Modify | Wall | Door | Window | Component | Column | Roof | Ceiling | Floor | Curtain System | Curtain Grid | Mullion | Railing | Ramp | Stair | Model Text | Model Line | Model Group | Room | Room Separator | Tag Room | Area | Area Boundary | Tag Area | By Face | Shaft | Wall | Vertical | Dormer | Level | Grid | Set | Show | Ref Plane | Viewer

Select | Build | Circulation | Model | Room & Area | Opening | Datum | Work Plane

Properties

3D View

3D View: From Parking Area | Edit Type

Graphics

Detail Level	Medium
Parts Visibility	Show Original
Visibility/Graphics Overrides	Edit...
Graphic Display Options	Edit...
Discipline	Architectural
Default Analysis Display Style	None
Sun Path	

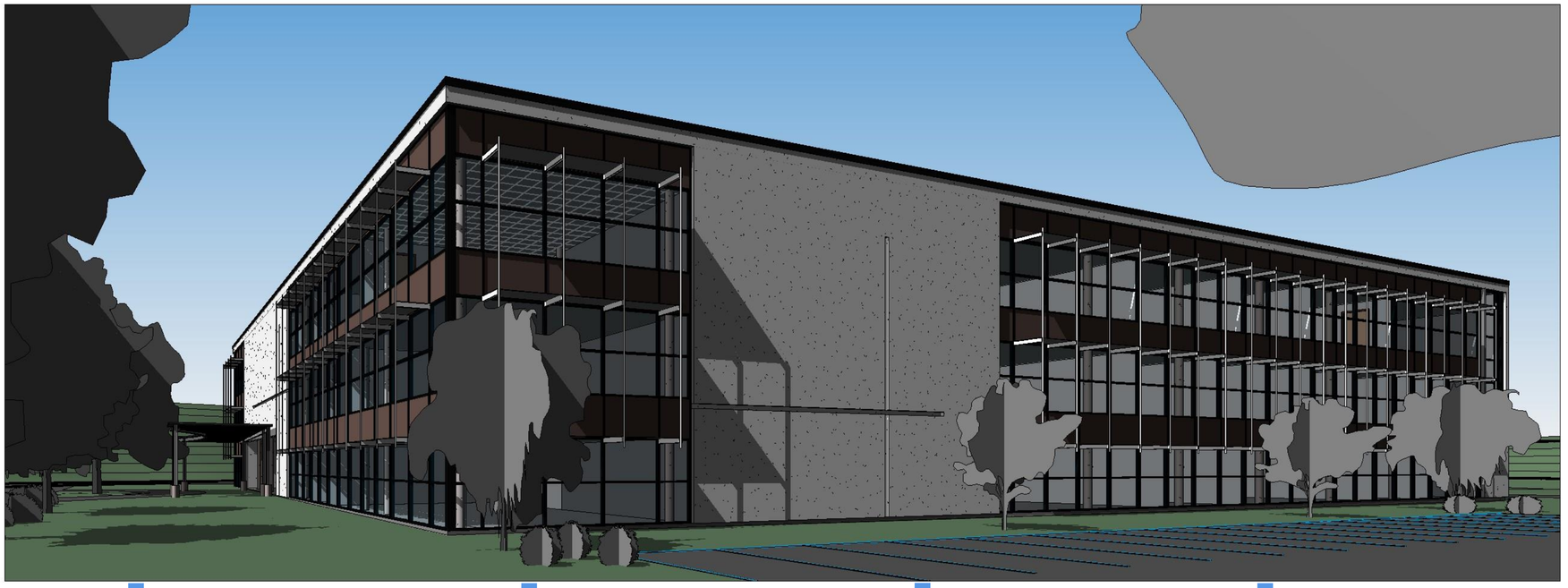
Extents

Properties help | Apply

Project Browser - rac_advanced_sample_project

- Views (all)
  - Floor Plans
    - 01 - Entry Level
    - 01 - Entry Level - Furniture Layout
    - 02 - Floor
    - 03 - Floor
    - Roof
    - Site
  - Ceiling Plans
    - 01 - Entry Level
    - 02 - Floor
    - 03 - Floor
    - Roof
  - 3D Views
    - 03 - Floor Public - Day Rendering
    - 03 - Floor Public - Night Rendering

From Parking Area



Rac_advanced_sample_project

Perspective

Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

Main Model

Revit setup

Revit single repository of data

- All design work Revit project..
- Make all changes to the building model in the Revit project

Revit setup

Setting up Revit 3D view

- Materials to all the elements.
- Reference for your final output (if any)
- Lighting placement/ without light

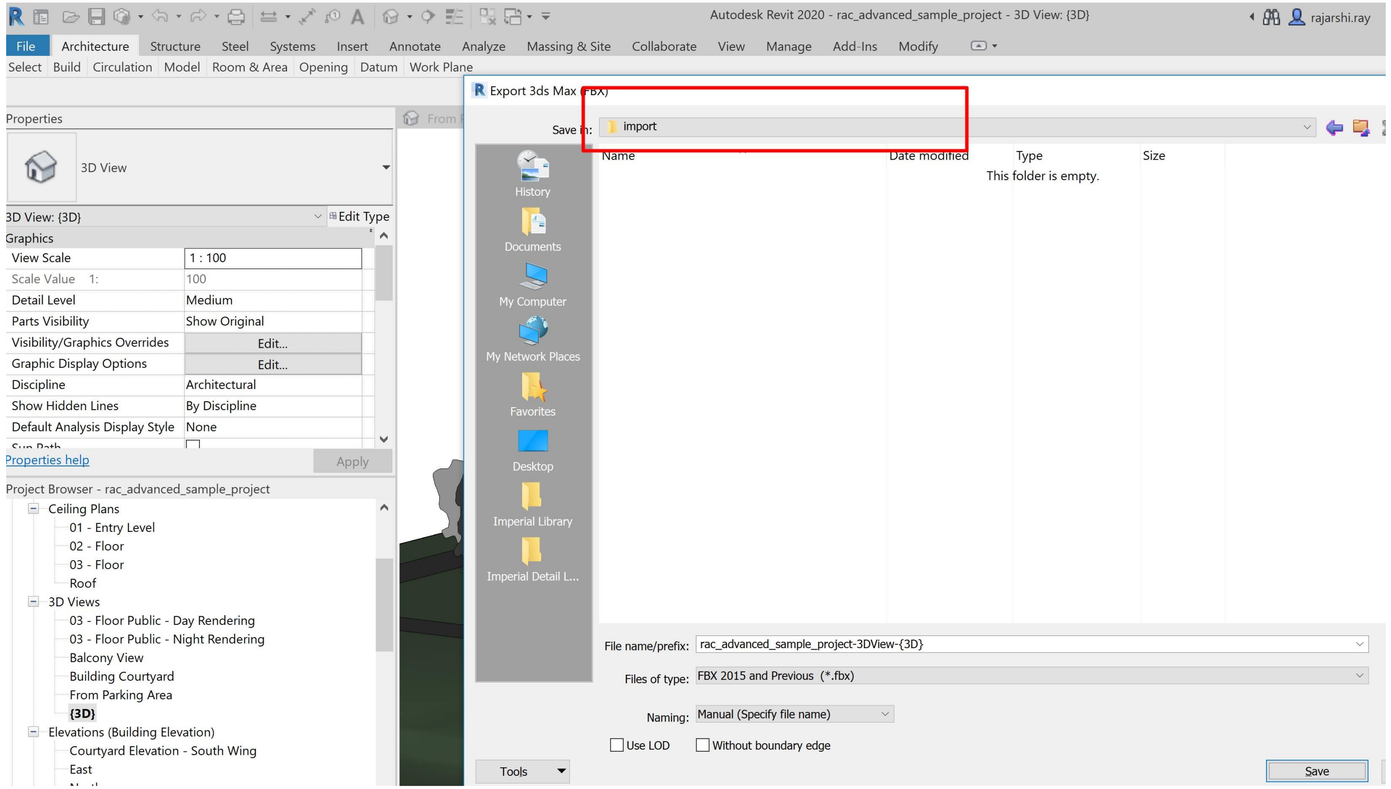
Revit setup

Video Demo Link

Exporting Revit Model

Exporting Revit Model

- Export as fbx
- Storing FBX in import folder of 3ds Max project

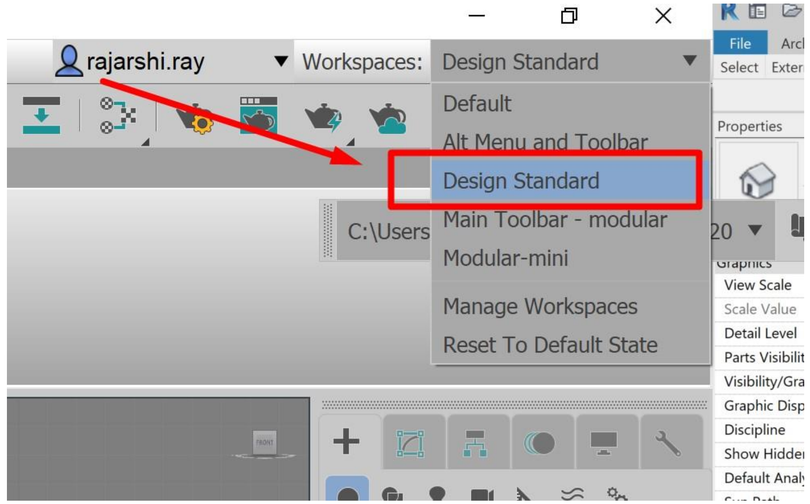


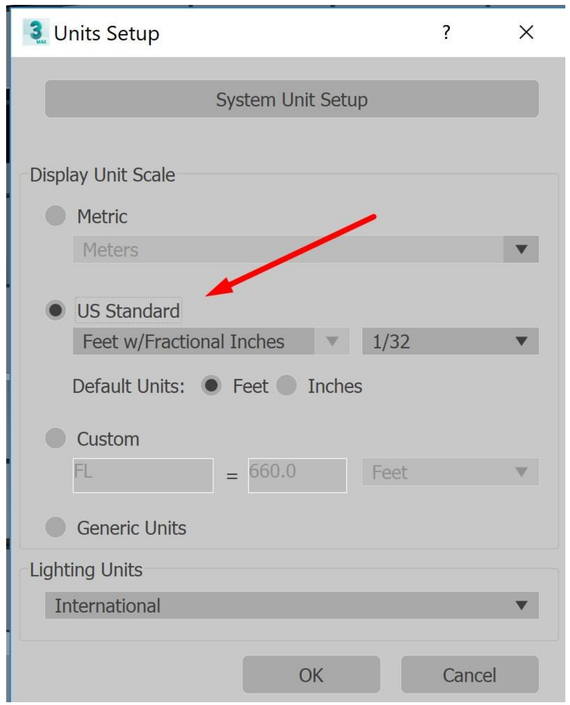
Importing Model into 3ds Max

Importing model into 3ds Max

House Keeping

- Switch to Design Standard workspace
- Change the unit setup in 3ds Max .

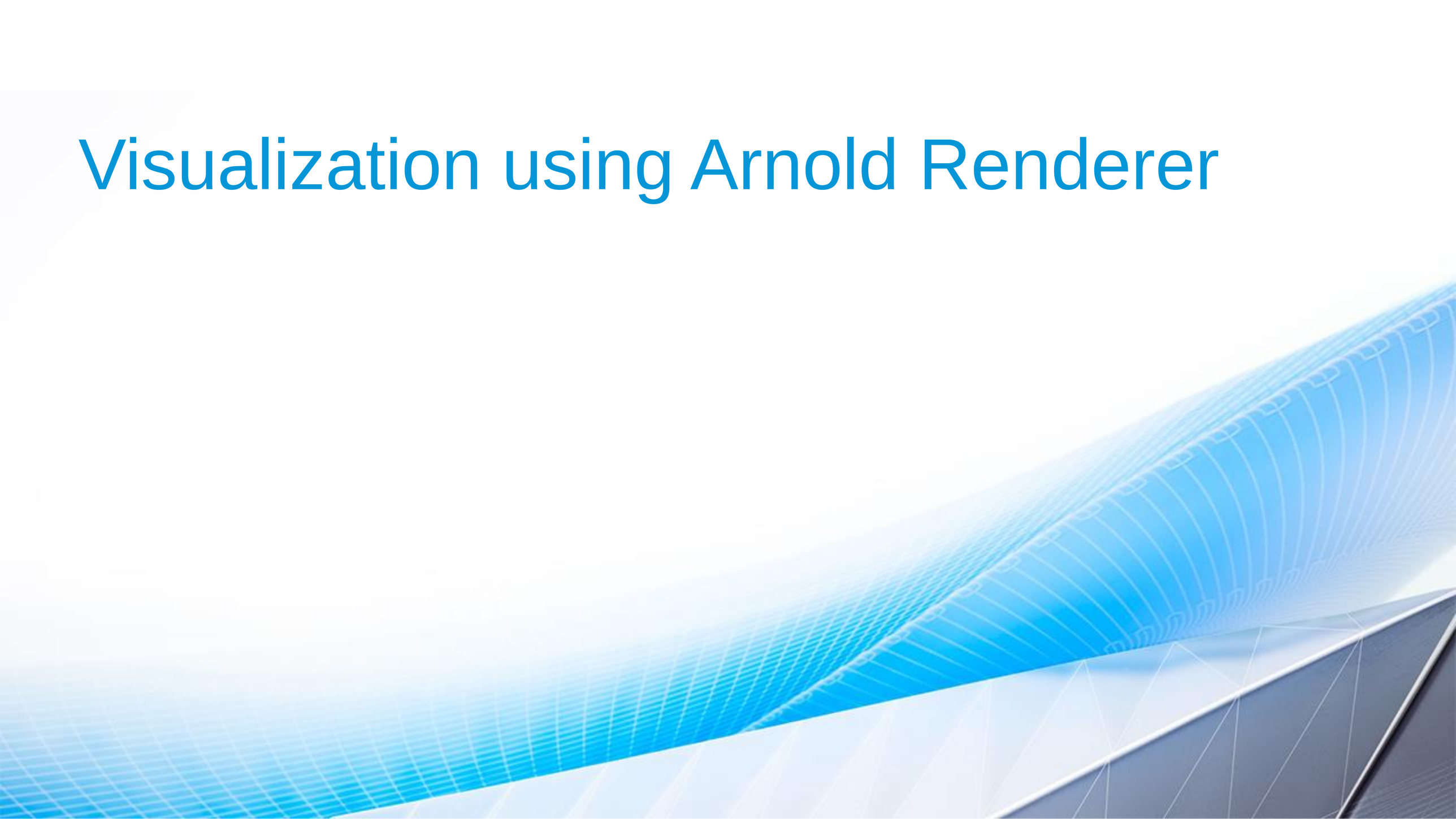




Video Demo Link

Quick Setup Of 3ds Max scene For Arnold Render

Visualization using Arnold Renderer



Why Arnold Render

- High-quality & production ready renderer with advanced Monte Carlo ray tracing
- Part of 3ds Max
- Easy to use & quick photorealism
- Easy to use Cross-platform support (Maya, Max, etc...)

Photo Credit (if applicable)

Setting up the 3ds Max scene

Scene converter

- Scene Converter easily converts your legacy scenes to take advantage of newer lights, materials, and renderer features
- We can set the default renderer
- Materials will be converted to Physically based Materials
- Cameras will be converted to Physically based Cameras

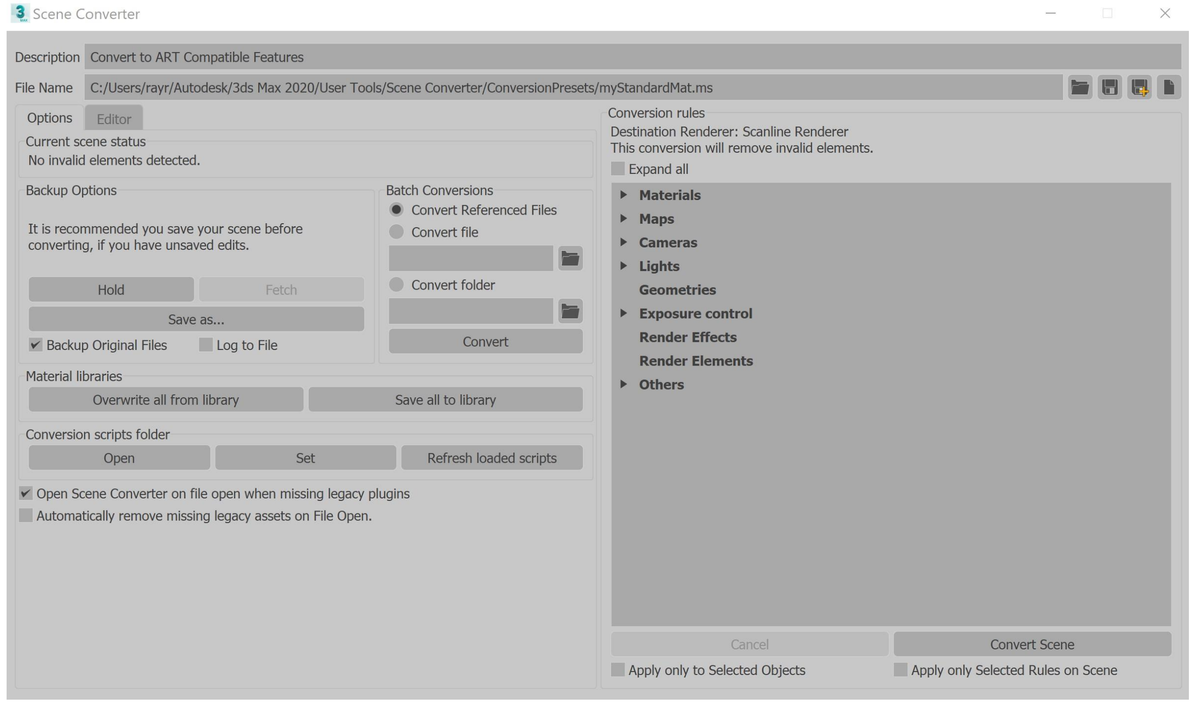


Photo Credit (if applicable)

Video Demo Link

Photo Credit (if applicable)

Setting up the 3ds Max scene

Lighting scene

- We will be using IBL to lights out scene
- Arnold will optimize renders when using its own lights
- We need 3 lights to setup our scene
    - Skydome for the environment
    - Distant light to act as the sun
    - Portal light to help carry light from the outdoor to your interiors

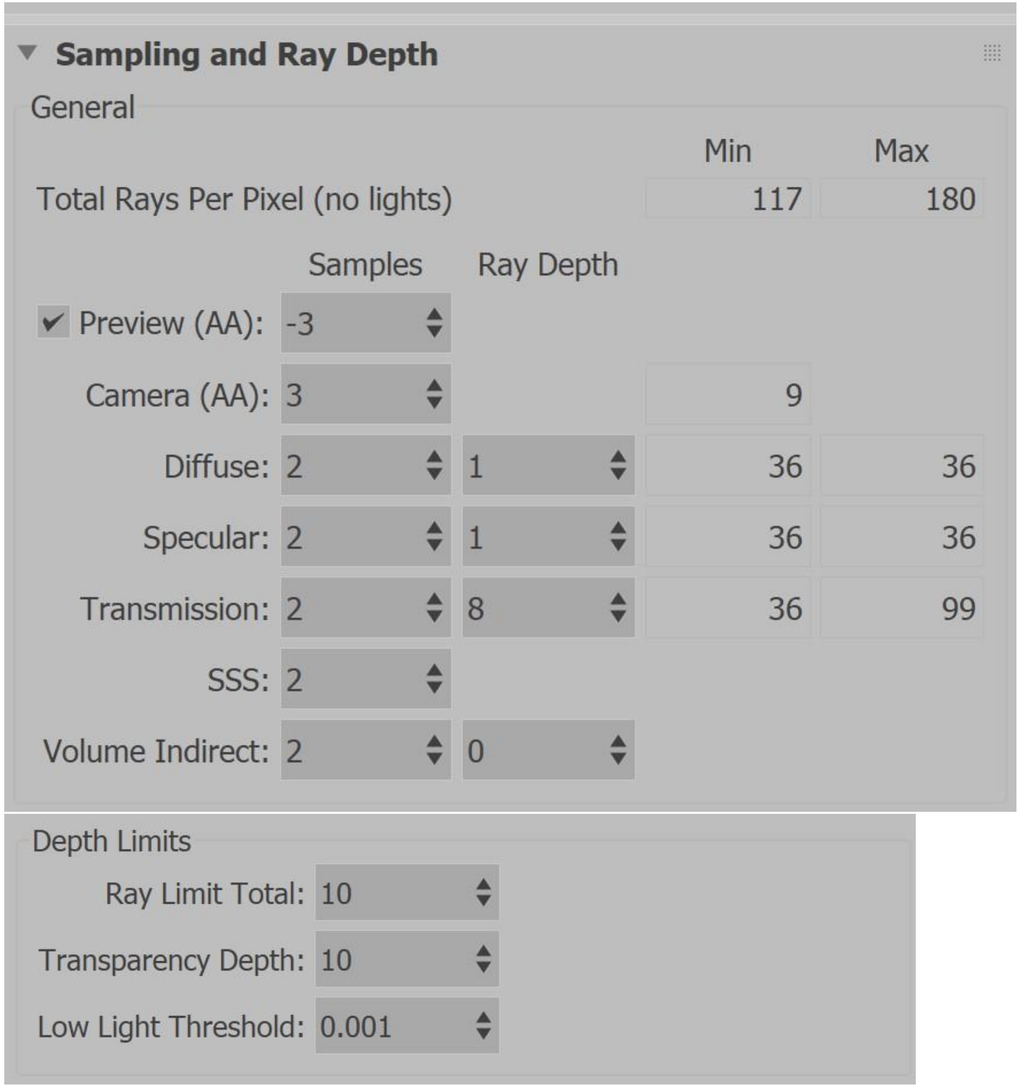
Video Demo Link

Setting up Arnold Render

Antialiasing & Sample

Samples

- Camera (AA) – *Find actual Problem*
- Increase of Camera (AA) increase overall render time but noise removed
- Ray Limit Total – Arnold restricts total number of Rays to be processed



Setting up render

Sampling

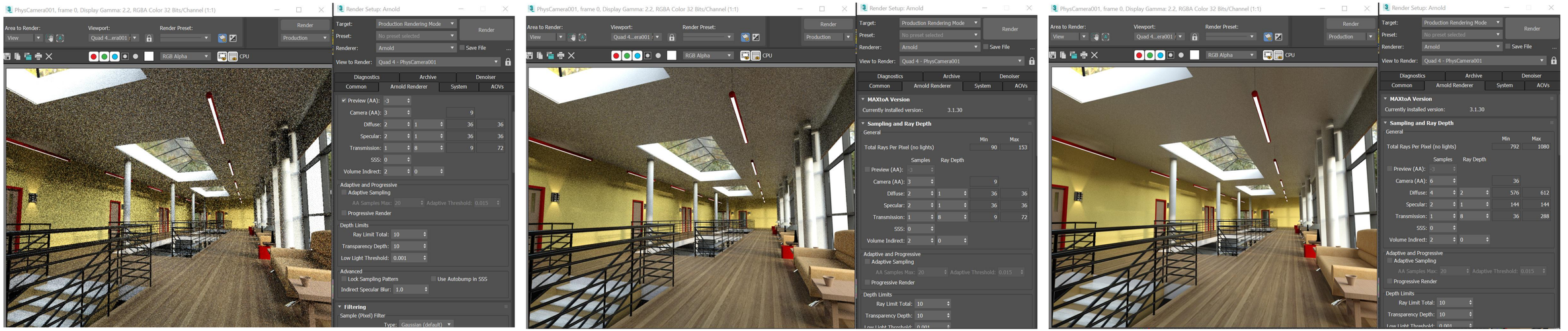


Photo Credit (if applicable)

Material Library Saving & Recall

Material Management

- Saving your material as library
  - *find all the materials in a scene*
  - *go into sub object materials*
  - *put them in a material library*
  - *save it*
- Update model and recall material library
  - *open the material library & check through all scene materials*
  - *if there is a match in the material library replace the material*
  - *unless it’s a sub object material in which case it tries to replace the sub materials*
- Saving your time

Video Demo Link

Before Taking To Game Engine

Model Optimization

Be Intentional

- CAD Data
  - Too much non-essential detail in CAD files
  - Same problem for rendering or AR/VR
  - Everything in the model needs to help you tell the story

- Optimizing the Scene
  - Delete
  - Manual rebuild
  - Automatic optimize

Implementing this for 3D Viewer on HoloLens

There are hard limits on the size of files, as well as the number of models, vertices, and meshes that can be open simultaneously in 3D Viewer Beta:

- 500 MB maximum file size per model
- Vertices: 600,000 combined on all open models
- Meshes: 1,600 combined on all open models
- Maximum of 40 models open at one time

File size

- Minimum 5 KB
- Maximum 500 MB

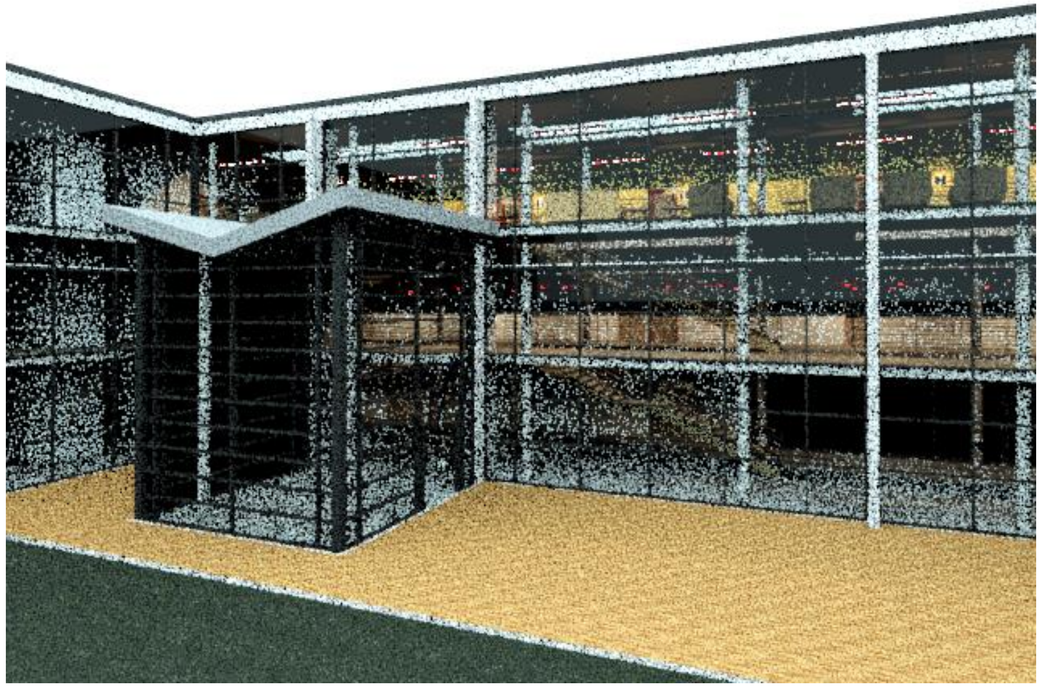
Hololens ver 1 limitations

Implementing this for VR

- 90fps minimum to reduce risk of motion sickness
- Number of polys less than 10 million
- Number of objects less than 2000
- Total bitmap size less than 8 gb

Implementing this for Rendering

- Reduce scene complexity to reduce render time
- Balance between noise & render time



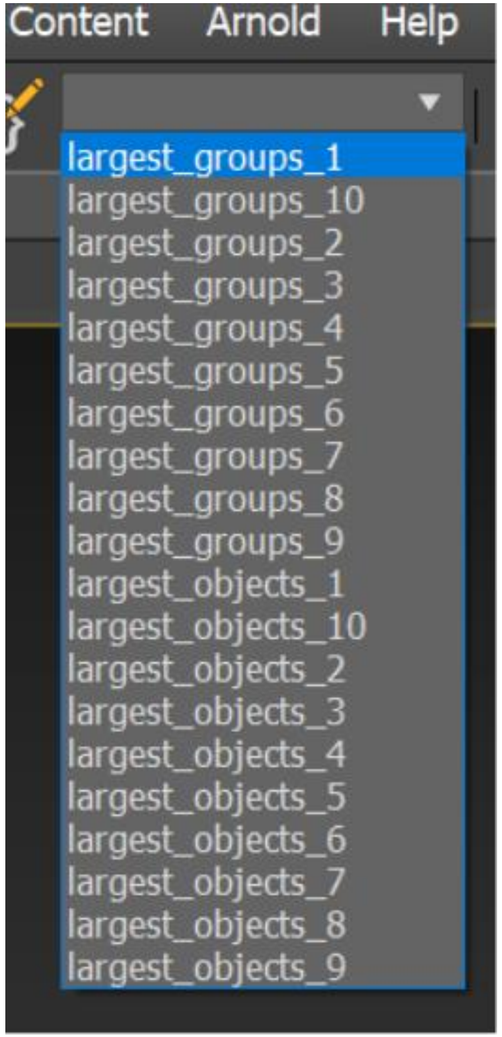
Model Optimization

Analyzing What's in the scene

Analyzing Scene file

- Analysis
  - Identify large models
  - Identify large groups of models
  - Be intentional of spending time optimizing the model

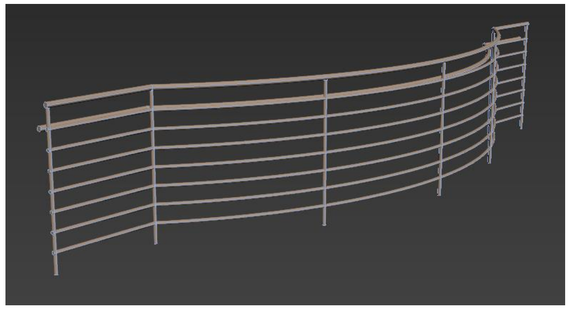
- Run the script to identify the objects we want to optimize
  - number of **objects = 5440**, total number of **faces 428640**

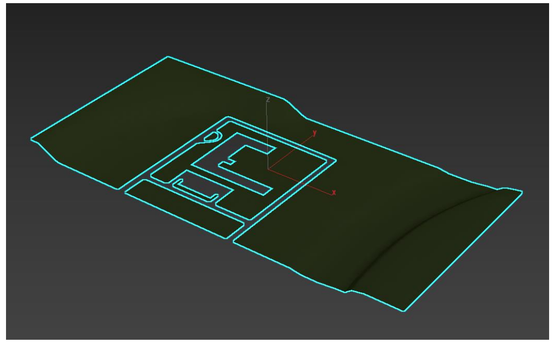


Video Demo Link

Top 10 largest objects

Railing Guardrail - Pipe [176909]	18425	4.3
Surface [105545]	12313	2.9
Railing 900mm Pipe - Wall Monted [173347]	6152	1.4
Railing 900mm Pipe - Wall Monted [181614]	6152	1.4
Railing 900mm Pipe - Wall Monted [181234]	6152	1.4
Railing 900mm Pipe - Wall Monted [175521]	6152	1.4
Railing 900mm Pipe - Wall Monted [180879]	6152	1.4
Railing 900mm Pipe - Wall Monted [181061]	6152	1.4
Railing 900mm Pipe [173351]	4000	0.9
Railing 900mm Pipe [180787]	4000	0.9





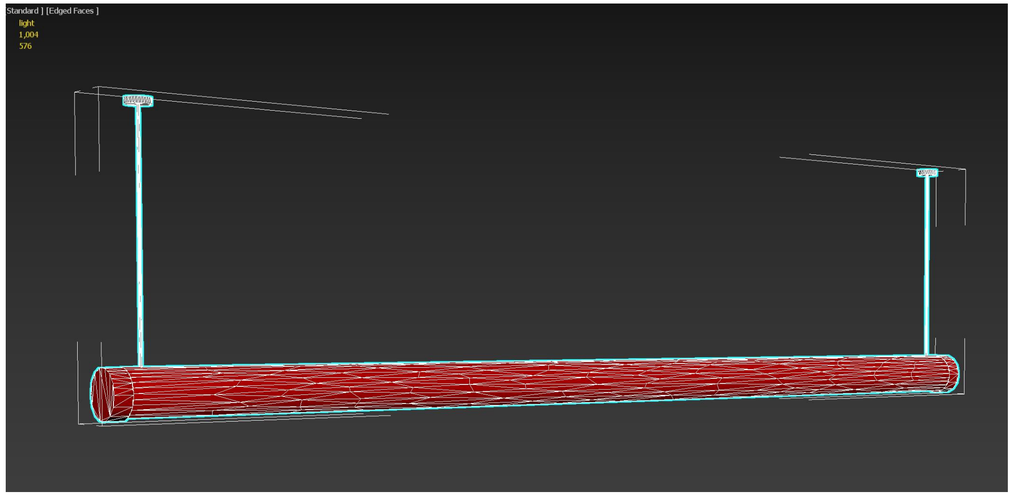
Top 10 largest groups

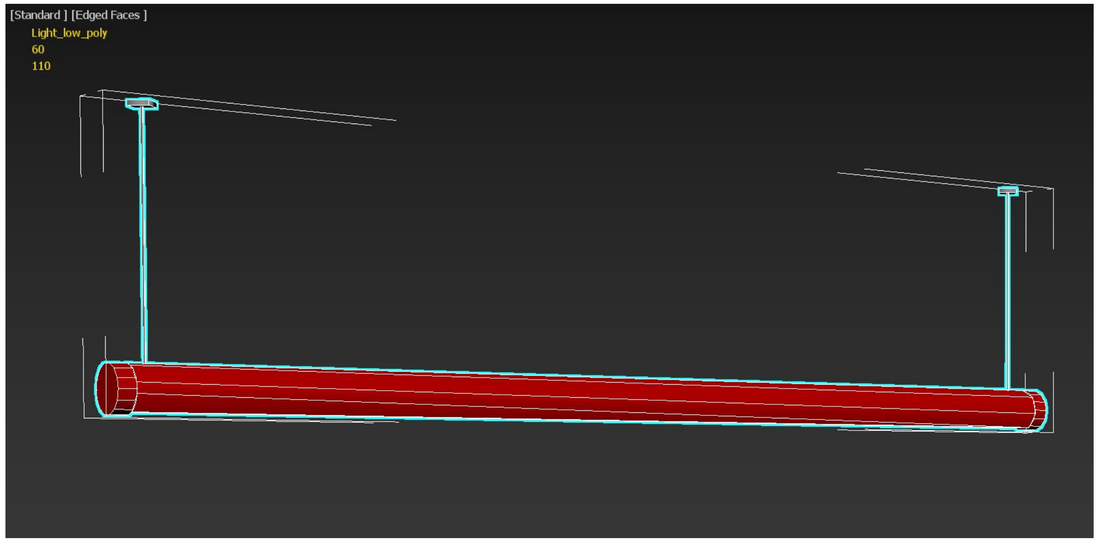
2376	60	142560	33.3
6152	6	36912	8.6
12	2996	35952	8.4
1004	30	30120	7
2190	7	15330	3.6
84	165	13860	3.2
3208	4	12832	3.0
4000	3	12000	2.8
8	1133	9064	2.1
2132	4	8528	2.0

Optimization Approach

Optimizer

- 3ds Max
  - Optimize
  - Mesh Optimizer
  - Pro Optimizer
- 3rd Party tools



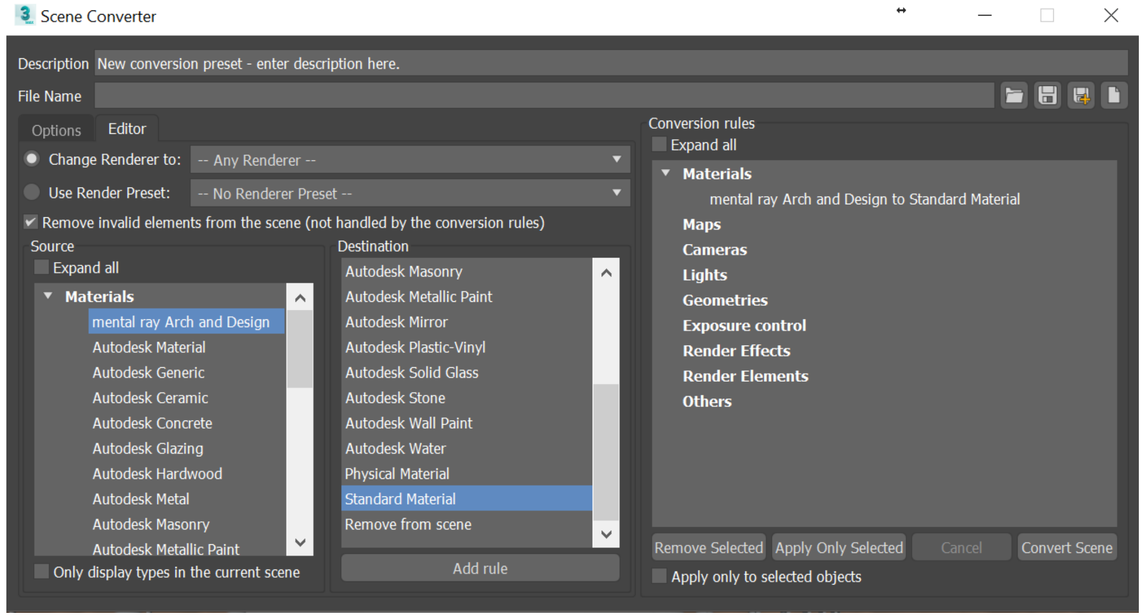


Before	After
1004	60

Before taking to game engine

Material Workflow

- What are the issues we are trying to solve
  - Lack of support for materials
  - Lose fidelity due to conversion
- Convert to standard material using Scene converter
- Do tweaks in games engine

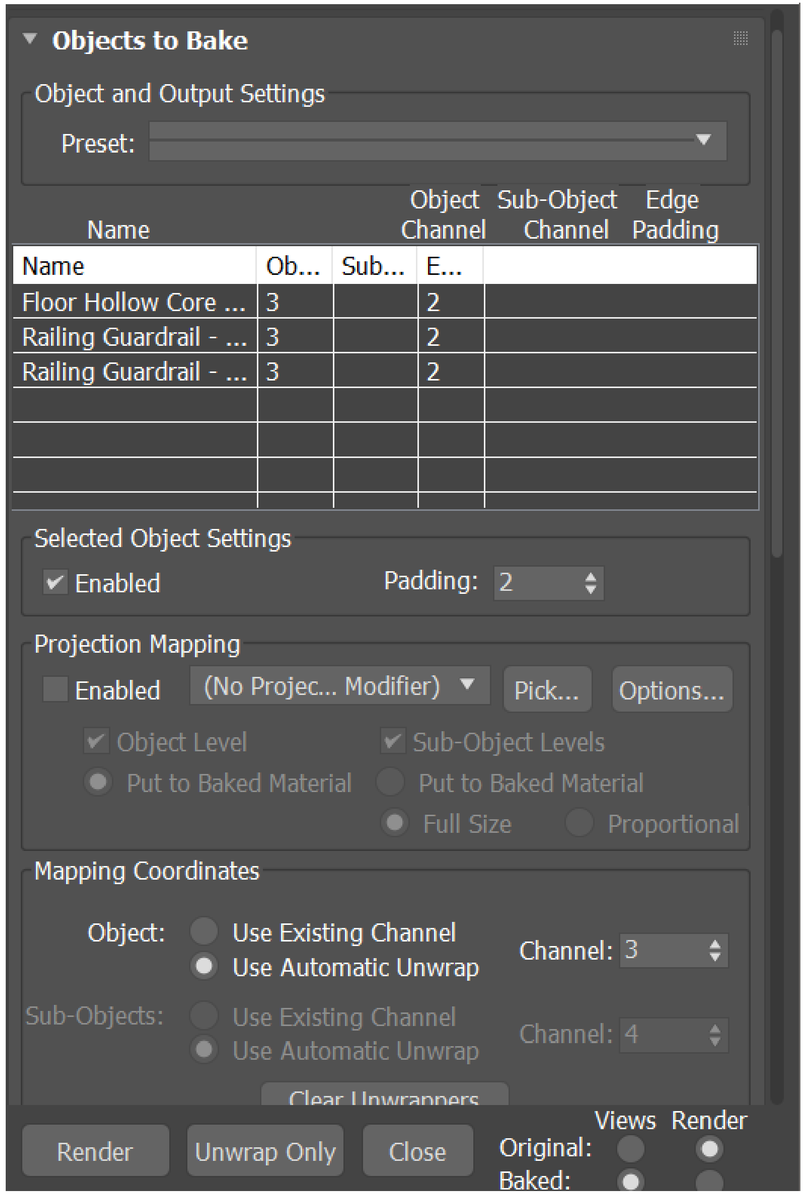


Missing texture

Video Demo Link

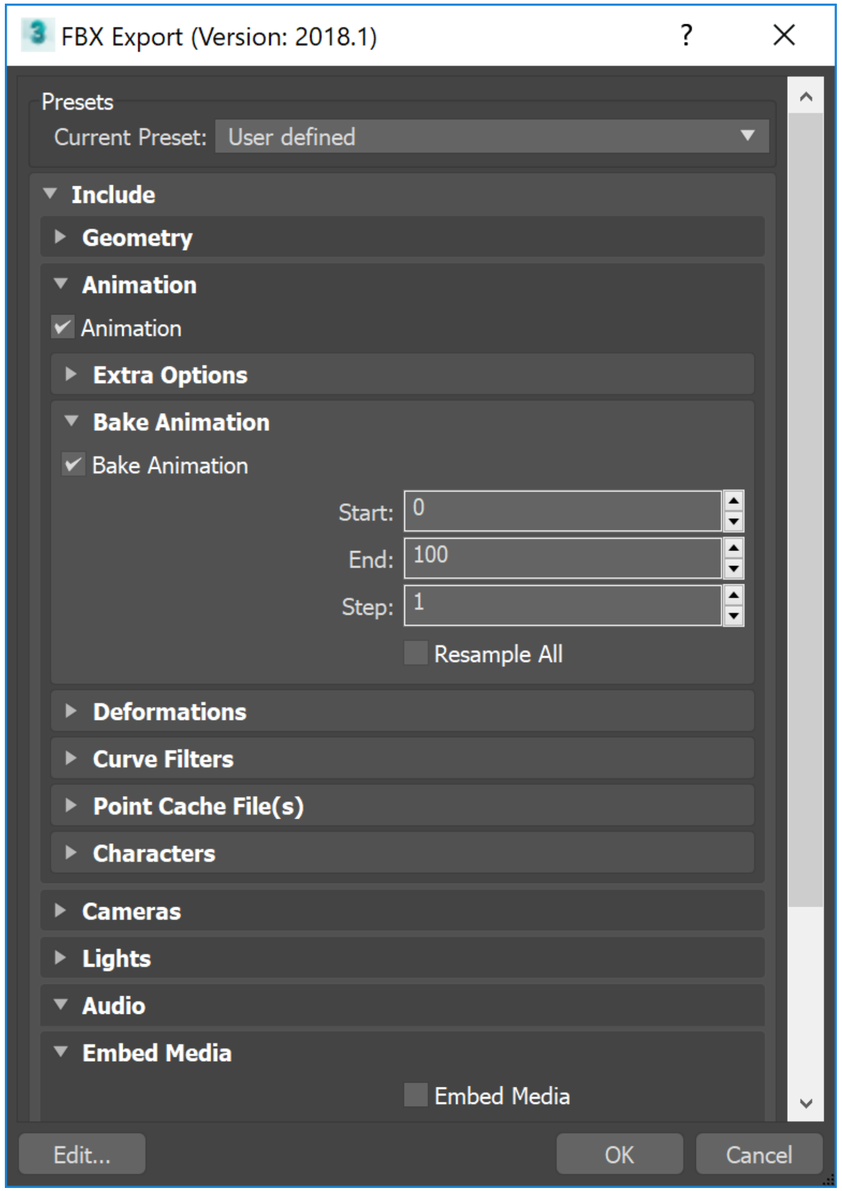
Lights

- Performance
  - Disable shadows
  - Reduce number of lights
- Baking
  - Selection of lights
  - Higher quality
  - Use of gpu memory
- Performance measurement
  - HUD
  - 3rd party gpu (gpuz) monitoring tool



Export from 3ds Max

- FBX export
  - Static Geometry
  - Animation
    - Activate bake animation
    - One fbx file per animated object
  - Embed Media



Exporting our model

Video Demo Link

Setting scene quickly in Unity

Video Demo Link


Q&A

Thank You

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